



# **NOAA's National Weather Service Advanced Hydrologic Prediction System (AHPS) and Inclusion of Reservoir Spills**

**Peter R. Ahnert**

**Middle Atlantic River Forecast  
Center, State College PA**

**Water Predictions  
for  
Life Decisions**

# Topics Covered

- **Mission**
- **Delaware Basin Overview**
- **Flood Forecasting/Warning Overview**
- **How Do You Get a 100 Year Flood?**
- **Snow/Rain Maps**
- **Summary of NWS Products**
- **Flood Loss Reductions from Flood Warnings**
- **Web Access to Products**
- **Reservoir Impacts**



# NOAA's NWS Mission Statement

- **“The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy.”**



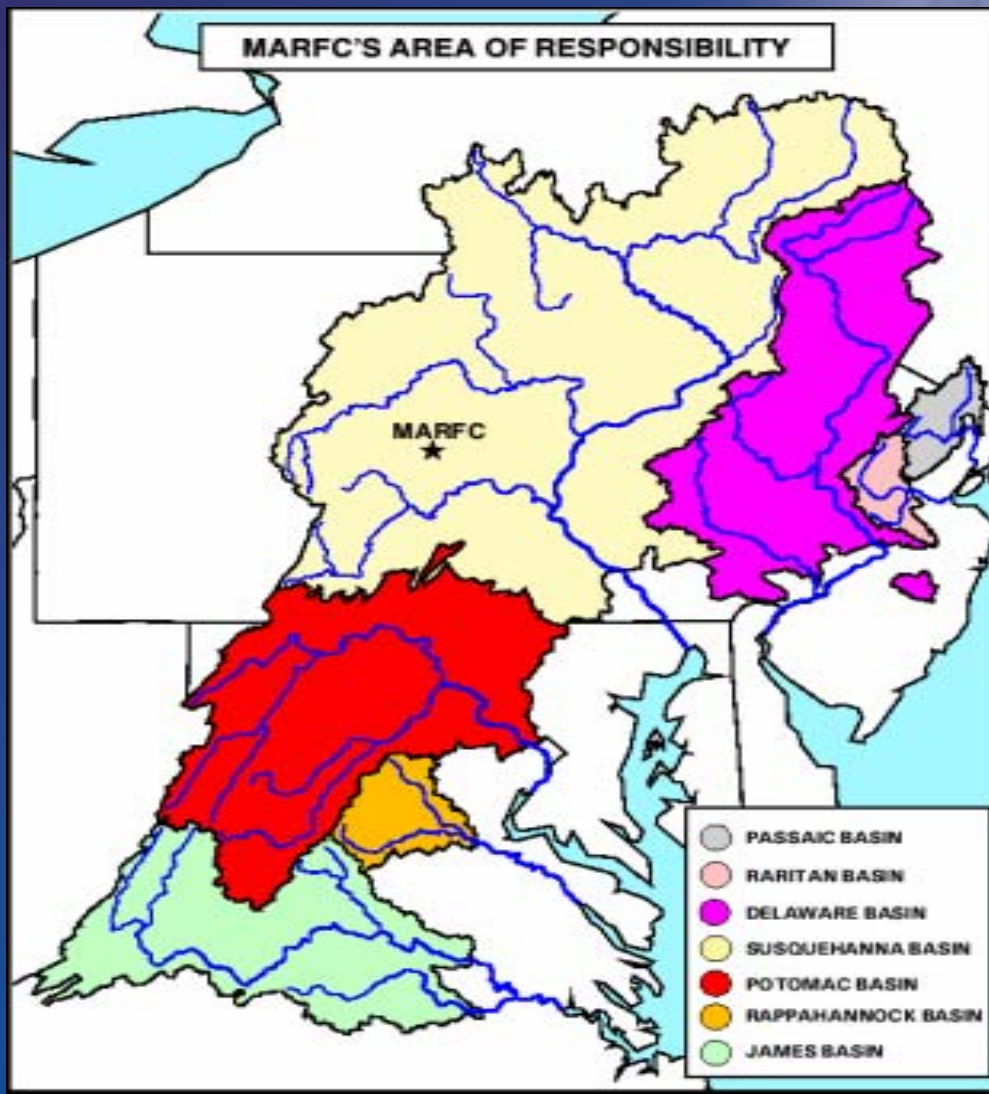
# Mission of Mid-Atlantic River Forecast Center

- **“The Middle Atlantic River Forecast Center produces timely and accurate water forecasts and information...using the best scientific principles to integrate and model water, weather, and climate information.”**





# MARFC AREA



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# Delaware River Basin



- Background:
- Longest un-dammed river east of the Mississippi
- Main stem 330 miles in length
- Drainage area - 13,539 square miles
- Includes PA, NY, NJ, and DE
- Provide 5% of the nations drinking water
- Provide NYC with 50% of its drinking water
- Accessible within a short drive to 20% of the people living in the U.S.





# Delaware River Basin



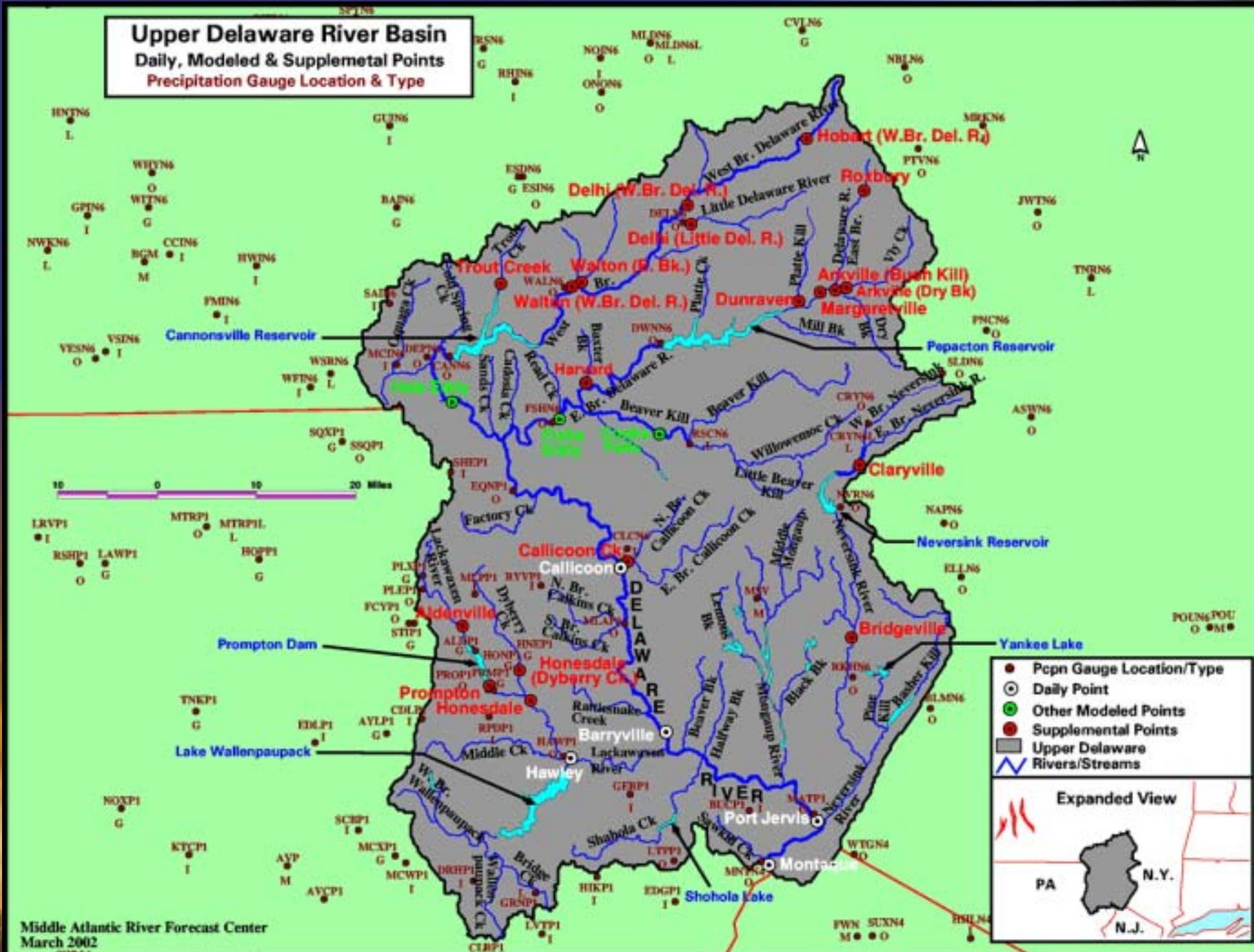
- Flood History:
  - *Major Flooding recorded since 1839*
  - Snowmelt: 1839, 1841, 1846, 1936, 1996
  - Severe Rainfall: 1850, 1862, 1942, 1975, 2005
  - Northeasters: 1869
  - Tropical Systems: 1933, 1938, 1955, 1972, 1996, 1999, 2001, 2004



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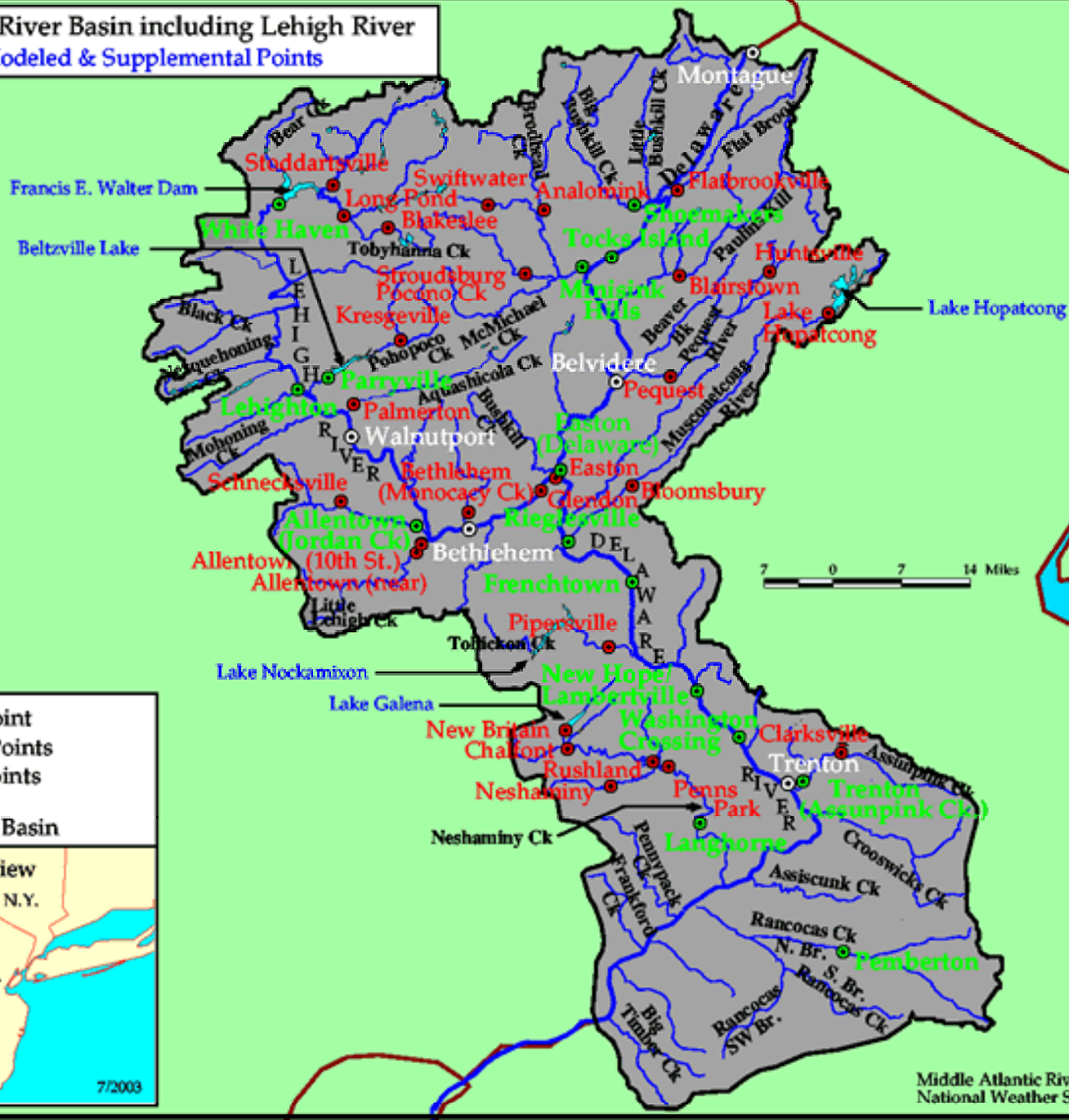


**Daily, Modeled & Supplemental Points**  
**Precipitation Gauge Location & Type**





Lower Delaware River Basin including Lehigh River  
Daily, Modeled & Supplemental Points



- ⊙ Daily Forecast Point
- Other Modeled Points
- Supplemental Points
- ~ Rivers/Streams
- ▭ Lower Delaware Basin

### Expanded View

N.Y.

PA.

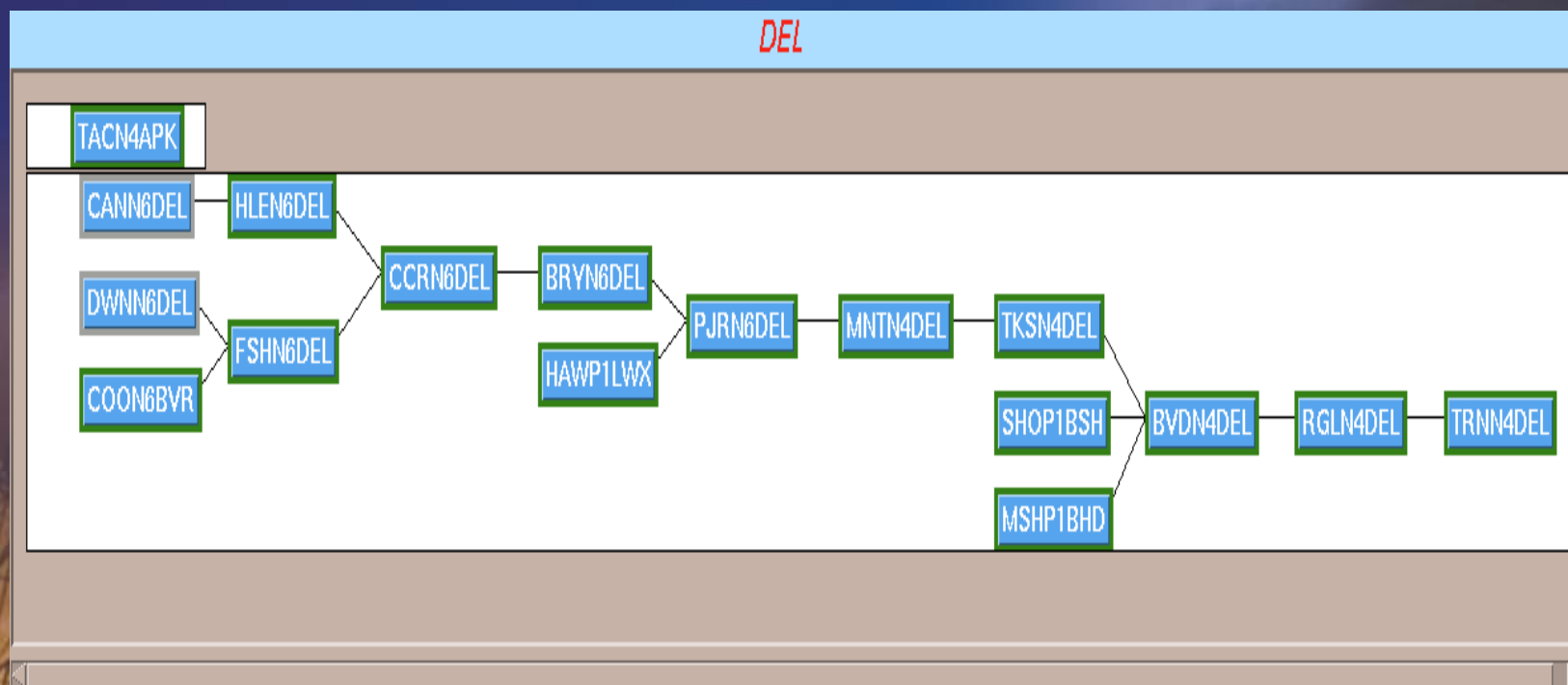
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7/2003

Middle Atlantic River Forecast Center  
National Weather Service



# Modeling Schematic

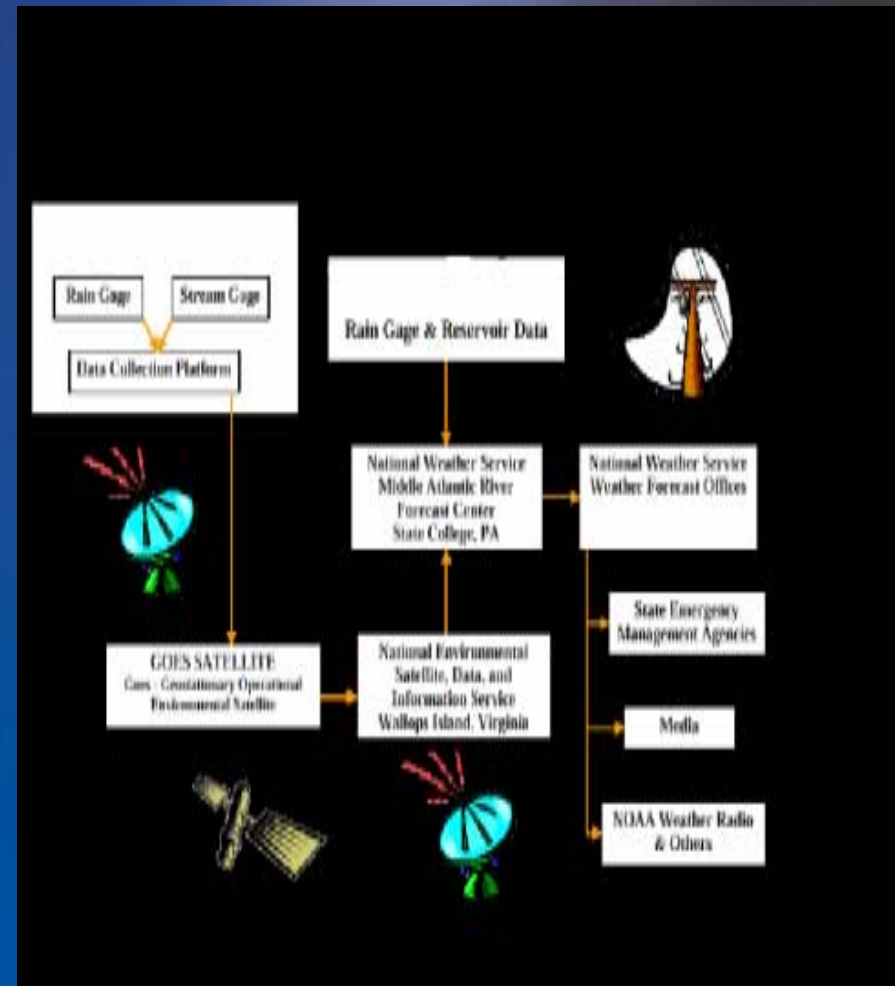




# River Flood Warning in the Delaware Basin



- Data collected from federal and state cooperators and volunteer observers
- Middle Atlantic RFC models river systems to forecast river stages and flows
- NWS forecast offices at Binghamton, NY and Mt Holly, NJ issue forecasts and warnings
- NWS river and flood forecasts disseminated via NOAA Weather Radio, media outlets, Internet







# Stream Gages and Flood Forecast Points in the Delaware River Basin



- 160 continuous record stream gages
- 118 gages have satellite telemetry
- 46 Flood Forecast Points

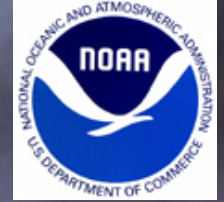


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# 100 Year Flood (from USGS)

## Fact Sheet 229-96



- Why Don't These Floods Happen Every 100 Years?
- The term "100-year flood" is misleading because it leads people to believe that it happens only once every 100 years. The truth is that an uncommonly big flood can happen any year... **There is a 1-in-100 chance that a flood this size will happen during any year. Perhaps a better term would be the "1-in-100 chance flood."**



# 100 Year Flood

## What Does It Take To Get One?



- Usually preceded by a wet period lasting months that “sets the stage” or an above normal snowpack.
- Often preceded a few days before by a “precursor flood event” that results in very wet soils and above normal river levels.
- Requires unusually heavy rain covering most of the river basin.





# 100 Year Flood

## What Does It Take To Get One?

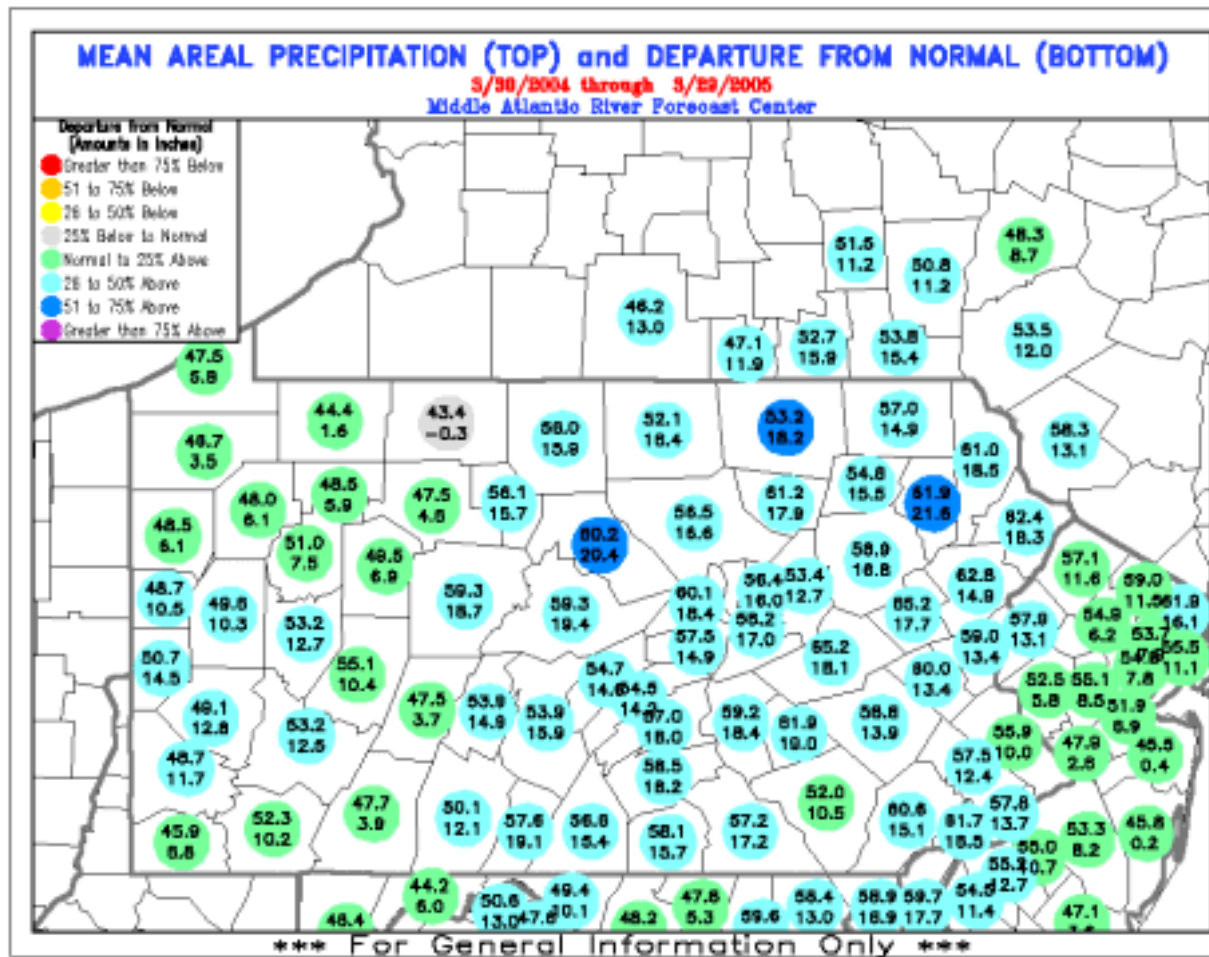


*"In Summary, it takes an unusual set of conditions that come together in an unusual sequence, at an unusual time and place to produce a rare event"*



# “Setting the Stage”

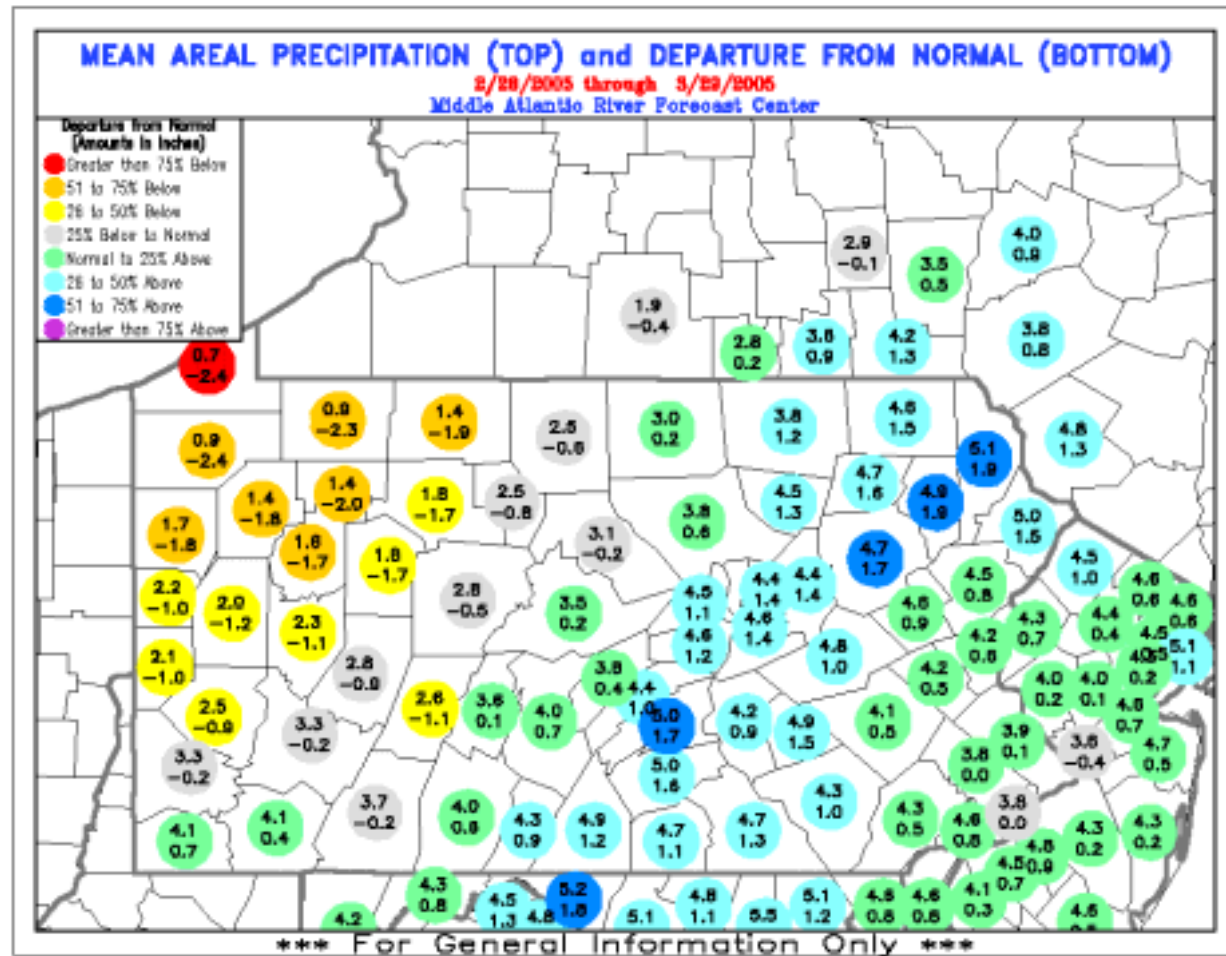
## 365 Day Precipitation Departures





# “Setting the Stage”

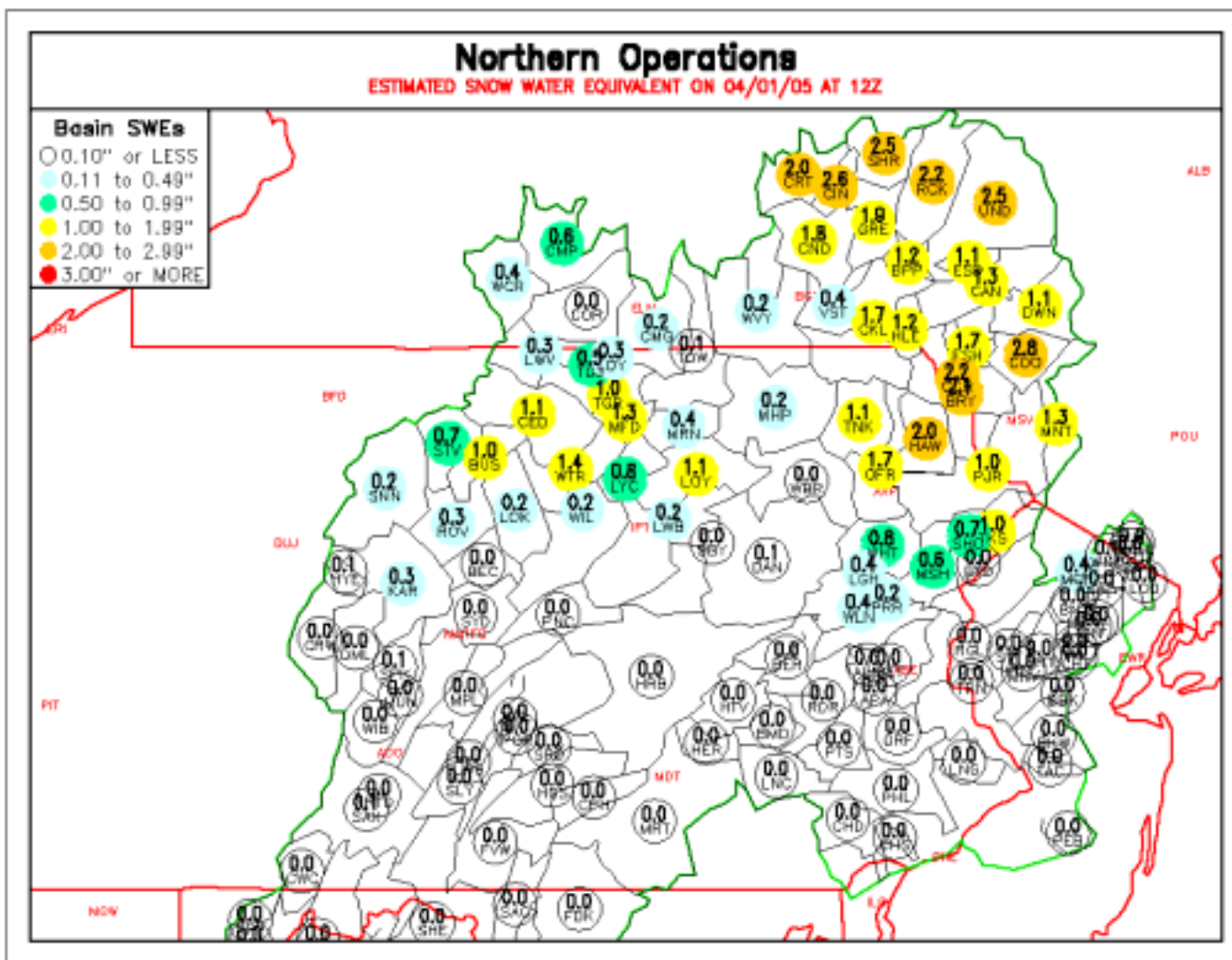
## 30 Day Precipitation Departures







# “Setting the Stage” Snow Water Equivalent 4/1/05



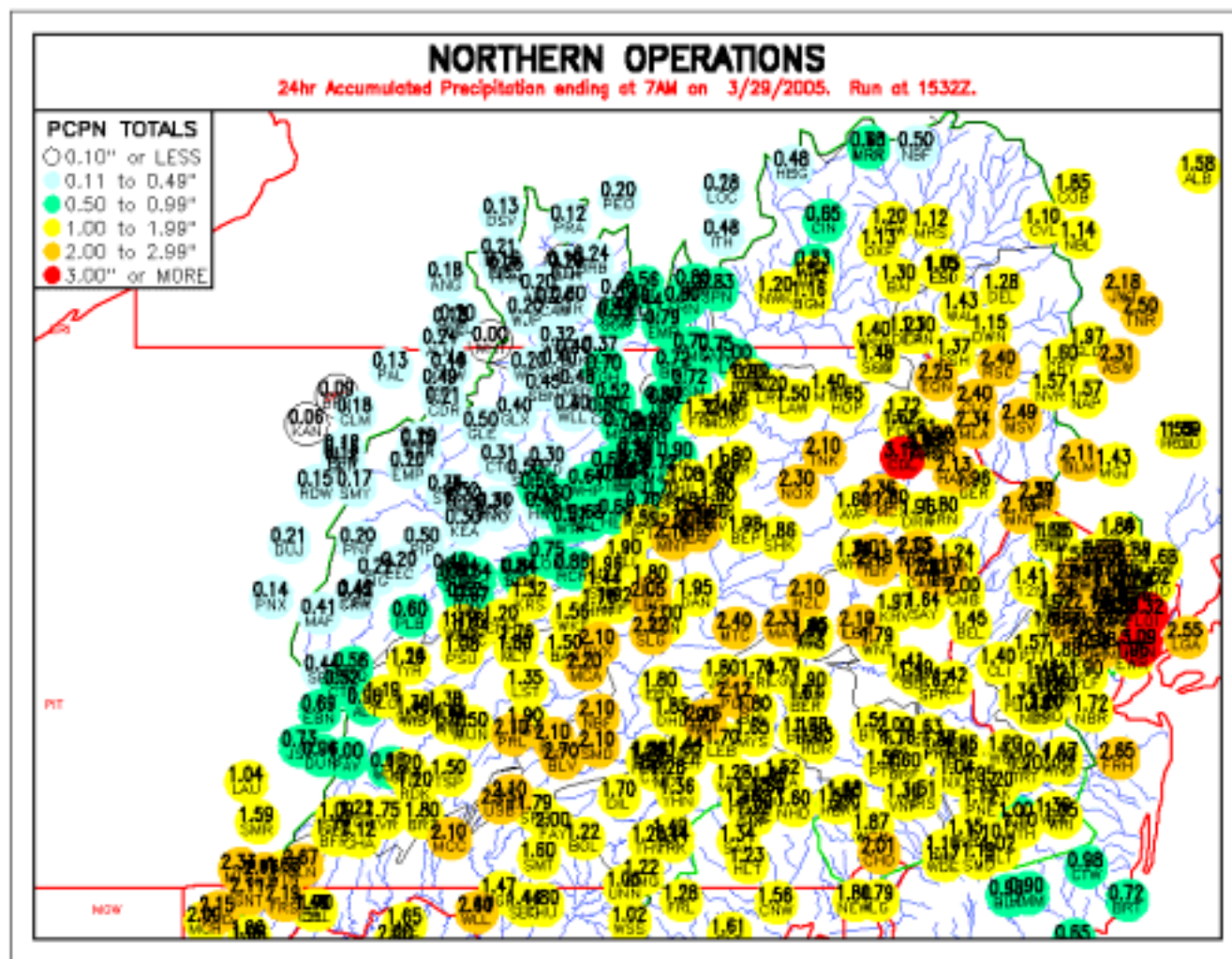
Predictions

Decisions



# “Precursor Event”

## 24 Hr Pcpn ending 7 am 3/29/05



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Decisions

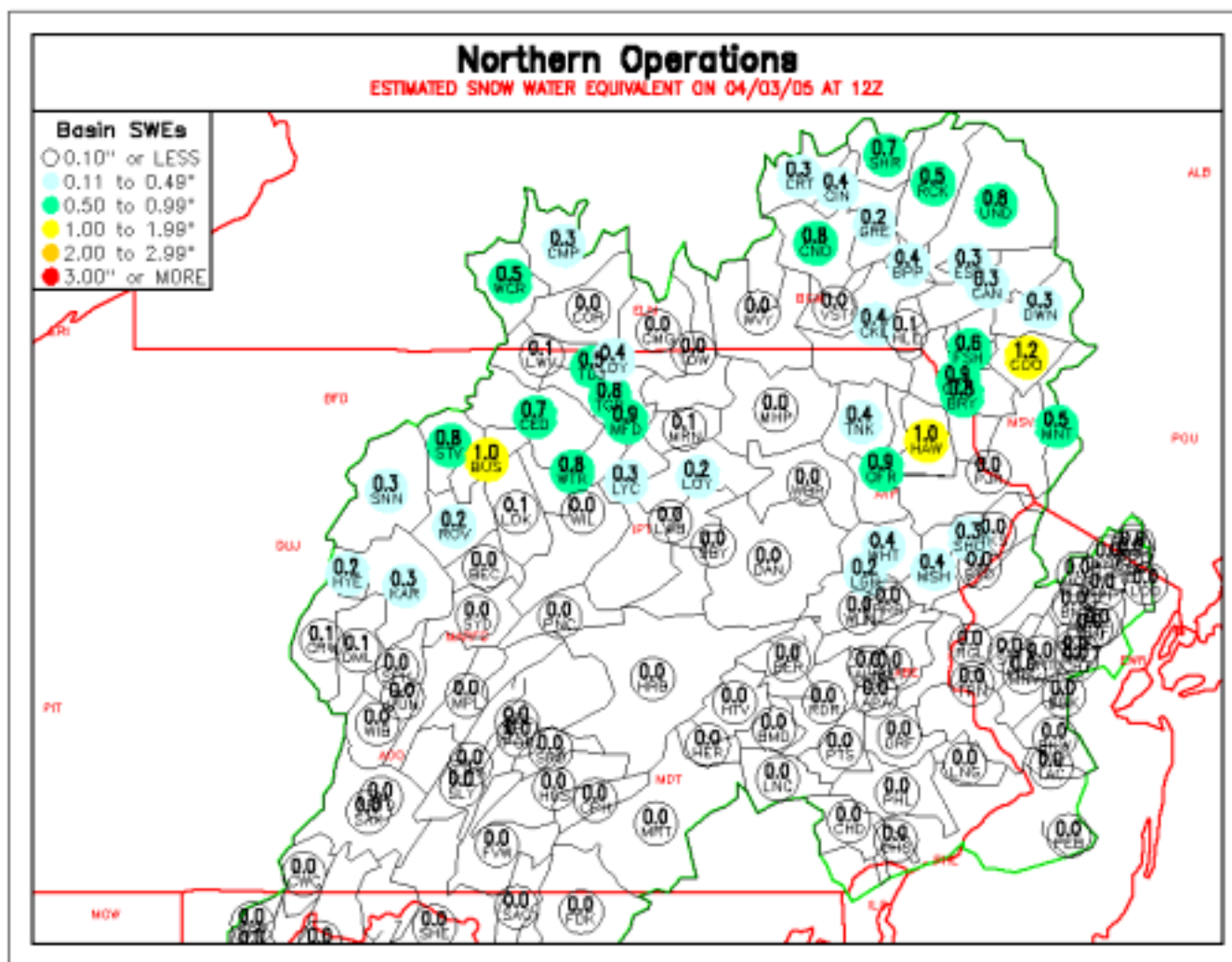








# 100 Year Flood Snow Water Equivalent 4/3/05



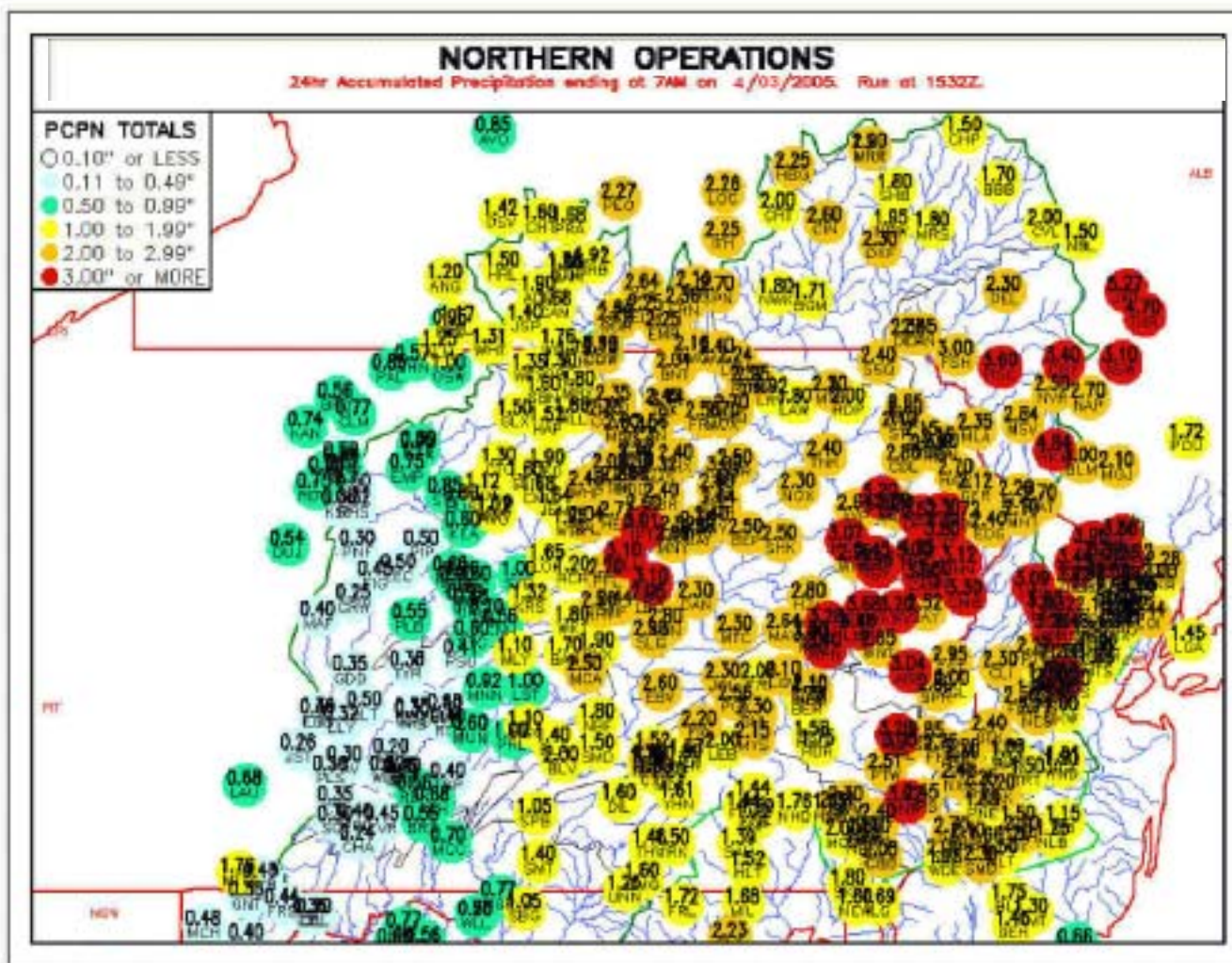
Predictions

Decisions



# “Widespread Heavy Rain”

## 24 Hr Pcpn ending 7 am 4/3/05



Predictions

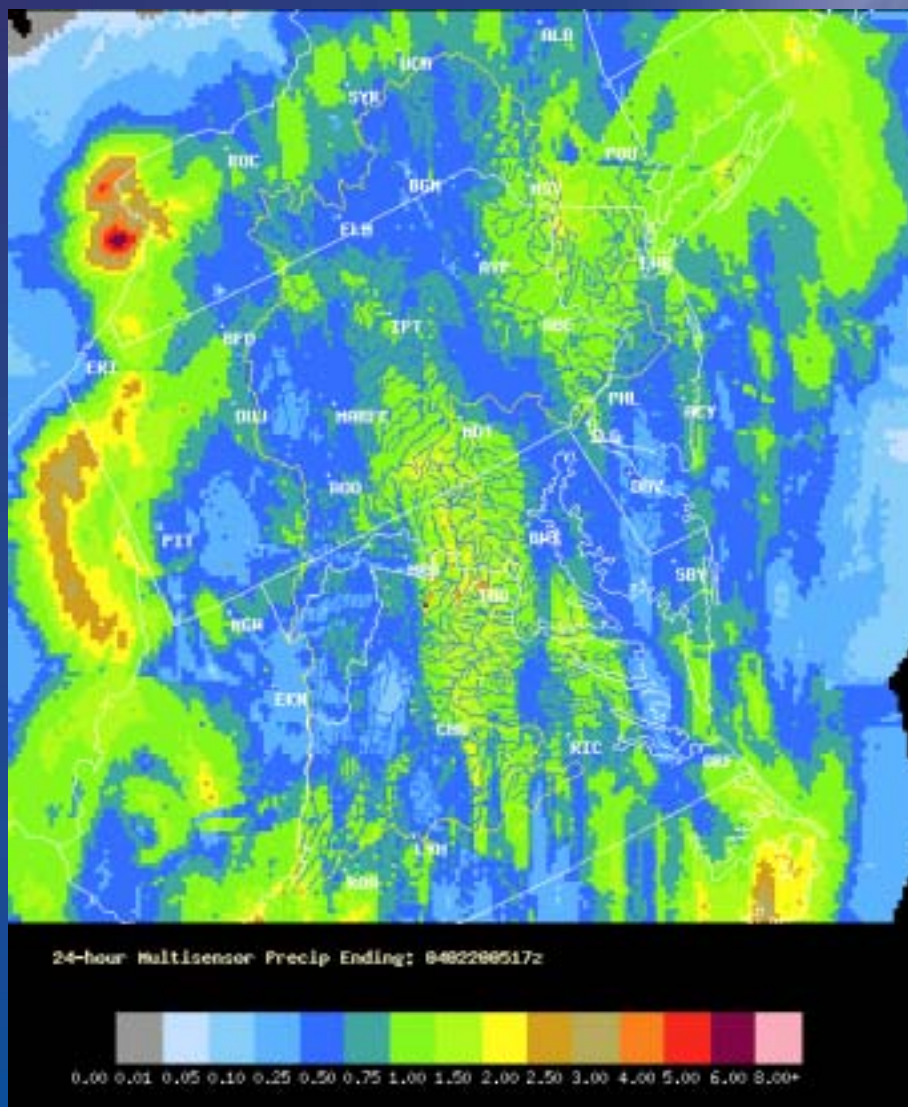
Life Decisions





# 100 Year Flood

## 24 Hr Pcpn ending 1 pm 4/2/05



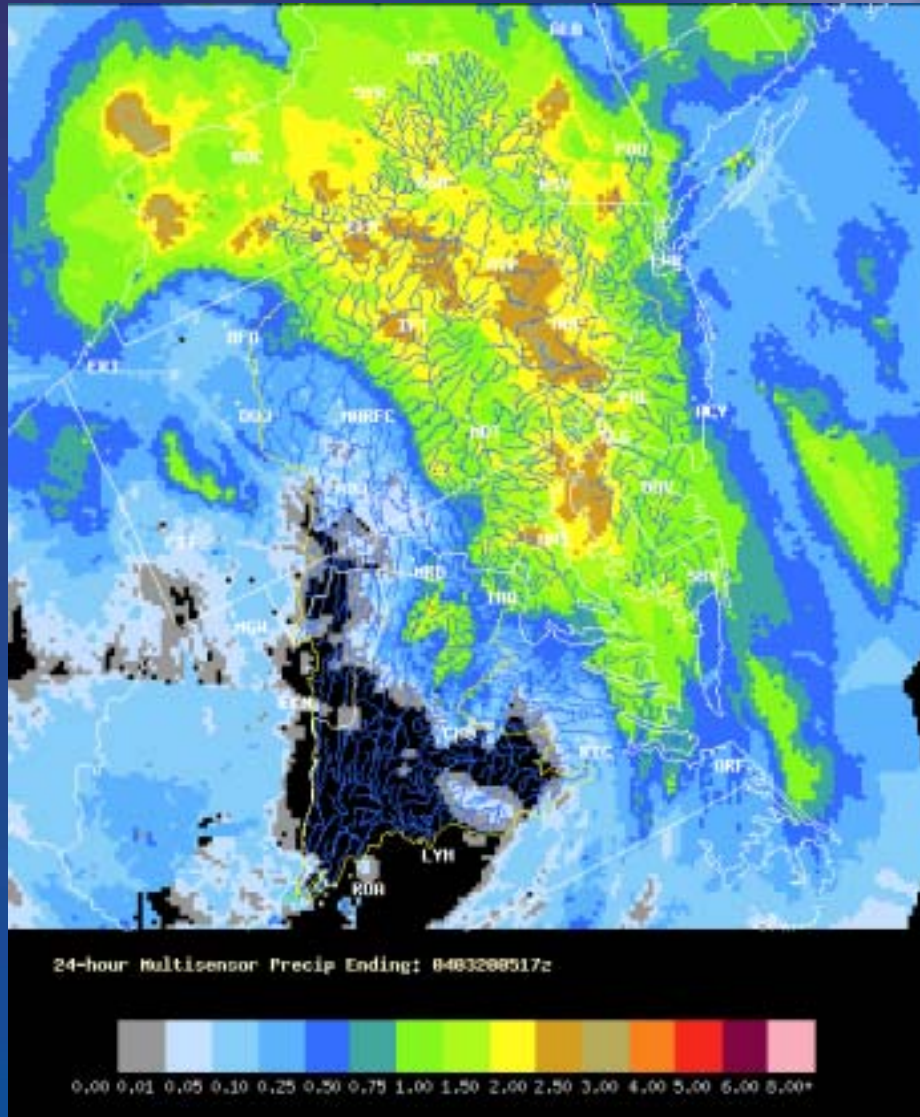
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Life Decisions





# 100 Year Flood

## 24 Hr Pcpn ending 1 pm 4/3/05

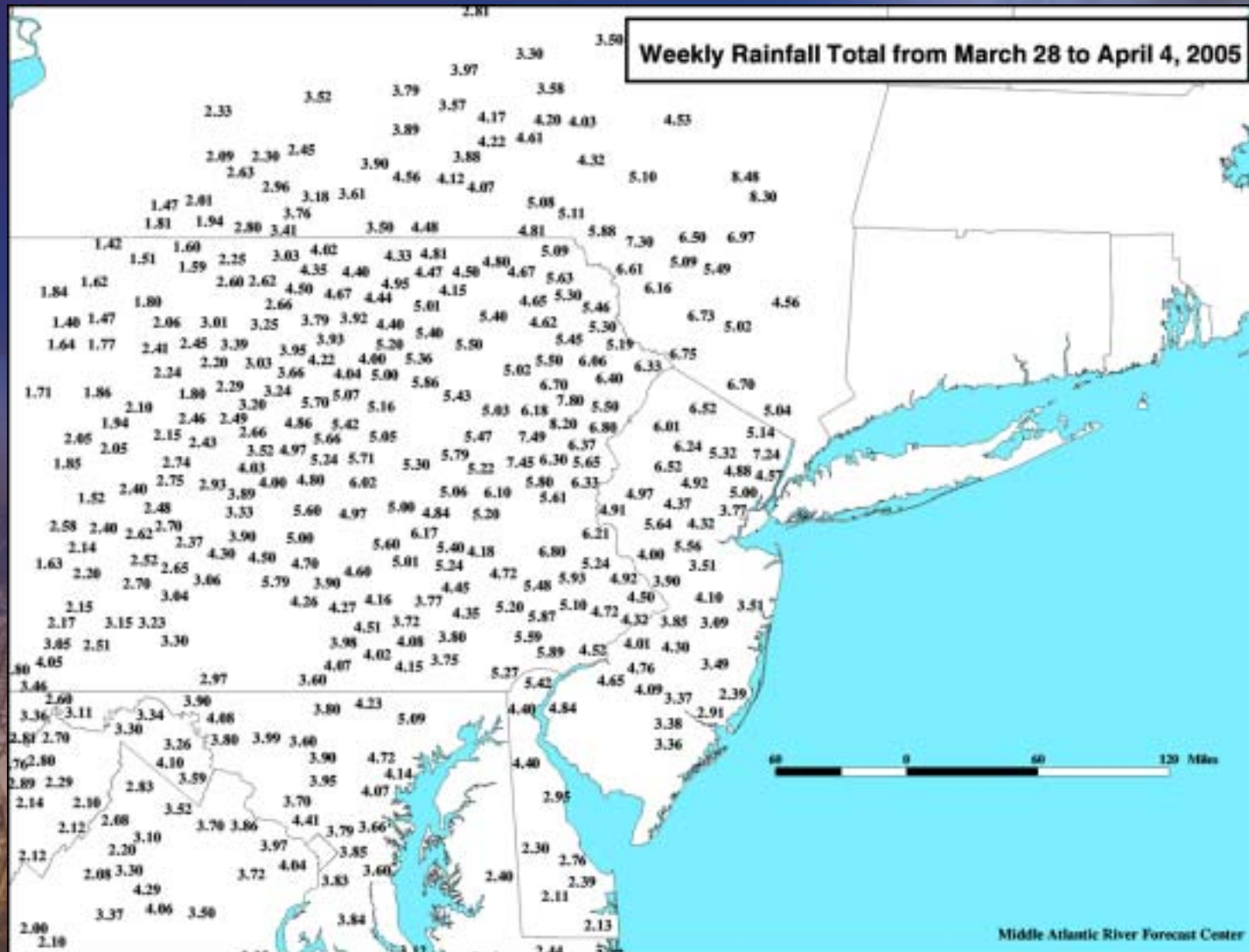


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# “Widespread Heavy Rain”

## Rainfall Total March 28 – April 4, 2005





# Summary of National Weather Service Products



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# 16 Days Before

## WINTER/SPRING RIVER FLOOD POTENTIAL OUTLOOK

**THURSDAY, MARCH 17, 2005**

MIDDLE ATLANTIC RIVER FORECAST CENTER

*...THE HIGHEST THREAT OF RIVER FLOODING DURING THE NEXT TWO WEEKS IS ACROSS THE NEW YORK AND NORTHERN PENNSYLVANIA BASINS DUE TO WET SOILS AND A DECENT SNOWPACK...AND WHILE NOT PRESENTLY FORESEEN, WARM AND/OR WET WEATHER COULD ARRIVE ACROSS THE NORTH DURING THE SECOND HALF OF THIS OUTLOOK PERIOD, WHICH COULD RATHER EASILY RESULT IN SOME RIVER FLOODING DEVELOPING....*

Water Predictions  
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Life Decisions



# 3 Days Before Hydrologic Outlook



- **HYDROLOGIC OUTLOOK**
- **NATIONAL WEATHER SERVICE BINGHAMTON NY**
- **225 PM EST WED MAR 30 2005**
- ...PERIODS OF RAIN ARE POSSIBLE LATE FRIDAY NIGHT AND SATURDAY ACROSS CENTRAL NEW YORK AND NORTHEAST PENNSYLVANIA...
- RAIN EARLIER THIS WEEK IN COMBINATION WITH SNOWMELT RUNOFF HAS BROUGHT HIGH FLOWS TO AREA STREAMS AND RIVERS. MILD DAYTIME TEMPERATURES IN THE 40S AND 50S FOR THURSDAY AND FRIDAY WILL CONTINUE TO MELT THE DEEPER SNOWPACK IN THE UPPER REACHES OF THE RIVER BASINS. THIS RUNOFF WILL CONTINUE TO KEEP HIGH STREAM AND RIVER FLOWS ACROSS THE REGION. THESE ANTECEDENT WEATHER CONDITIONS HAVE MADE CENTRAL NEW YORK AND NORTHEAST PENNSYLVANIA VERY FLOOD SENSITIVE.
- A STORM SYSTEM WILL BE DEVELOPING OVER THE MID-ATLANTIC REGION LATE FRIDAY. THE EXACT TRACK AND STRENGTH OF THIS STORM IS UNCERTAIN AT THIS TIME...BUT **THERE IS A POTENTIAL FOR PERIODS OF RAIN DEVELOPING FRIDAY NIGHT AND SATURDAY ACROSS THE REGION. IF THE THREAT FOR FLOODING BECOMES MORE CERTAIN...FLOOD WATCHES WILL BE ISSUED BY THE NATIONAL WEATHER SERVICE.** STAY TUNED TO NOAA WEATHER RADIO...OR LOCAL MEDIA OUTLETS...FOR THE LATEST UPDATES.

Water Predictions  
for  
Life Decisions



# 3 Days Before Hydrologic Outlook



- **HYDROLOGIC OUTLOOK**
- **NATIONAL WEATHER SERVICE MOUNT HOLLY NJ**
- **300 PM EST WED MAR 30 2005**
- ...ANOTHER ROUND OF HEAVY RAIN IS POSSIBLE FRIDAY NIGHT INTO
- SATURDAY...
- THERE IS STILL SOME UNCERTAINTY AS TO THE EXACT AMOUNT OF RAINFALL THAT WILL OCCUR ACROSS THE REGION. AT THIS TIME...IT APPEARS THAT 1 INCH OF RAINFALL IS POSSIBLE WITH AMOUNTS AS HIGH AS 2 INCHES...DEPENDING ON THE TRACK AND STRENGTH OF THE LOW.
- **MANY LOCATIONS RECEIVED BETWEEN 1 AND 2 INCHES OF RAIN EARLIER THIS WEEK AND ANY NEW RAINFALL WILL INCREASE THE FLOOD THREAT.**
- NUMEROUS STREAMS AND CREEKS EXPERIENCED FLOODING WITH THE PAST SYSTEM AND WHILE MOST CREEKS AND STREAMS ARE CRESTING OR ALREADY FALLING...THEY WILL REMAIN HIGH THROUGH THE END OF THE WEEK.
- STAY TUNED TO NOAA WEATHER RADIO OR OTHER LOCAL MEDIA FOR FURTHER UPDATES ON THIS DEVELOPING SITUATION. IT IS POSSIBLE THAT A FLOOD WATCH MAY BE ISSUED AT A LATER TIME.

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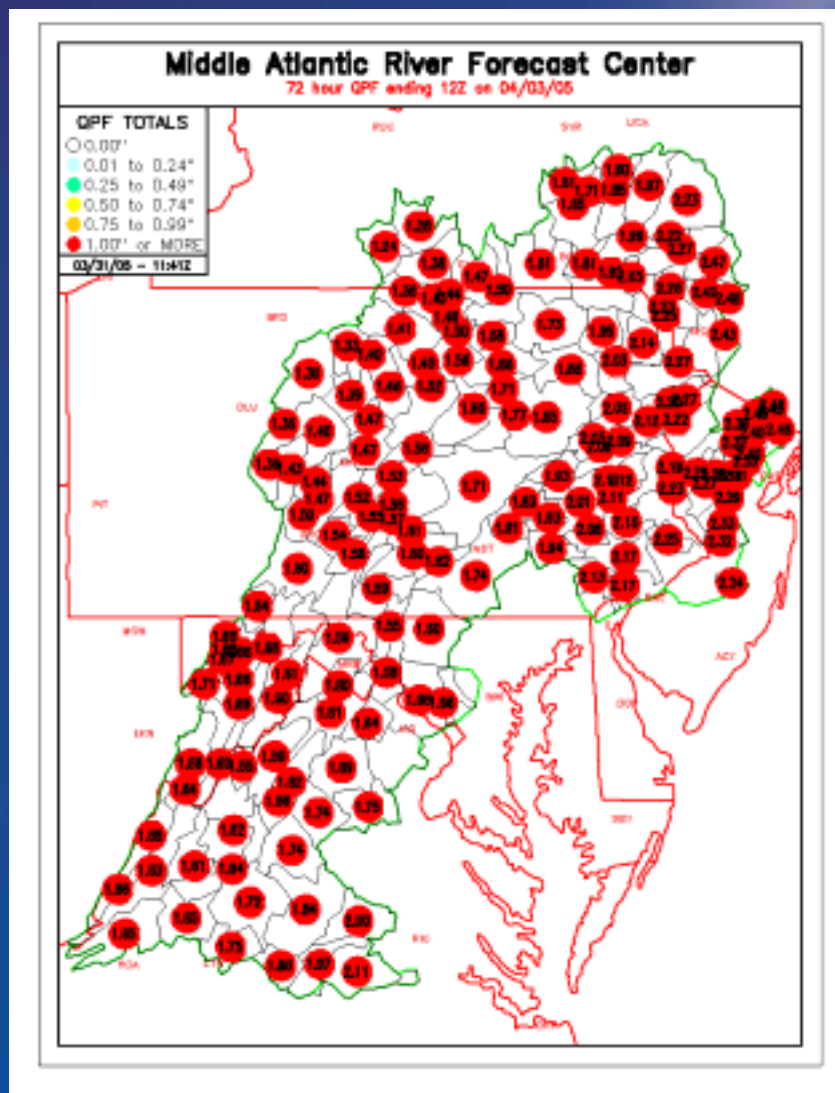
Water Predictions  
for  
Life Decisions





# 2 Days Before

72 Hr Rainfall Forecast Issued Thursday 3/31/05



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Life Decisions



# 2 Days Before

## SPRING RIVER FLOOD POTENTIAL OUTLOOK

Number 05-8

THURSDAY, MARCH 31, 2005

MIDDLE ATLANTIC RIVER FORECAST CENTER

**SPECIAL NOTE: THE SHORT-TERM (NEXT FIVE DAYS) RIVER FLOOD POTENTIAL IS VERY HIGH ACROSS MOST OF THE MARFC SERVICE AREA DUE TO THE POTENTIAL FOR ANOTHER HEAVY RAIN EVENT THIS COMING WEEKEND... *DUE TO HIGH STREAMFLOW AND WET SOILS, ANOTHER ROUND OF WIDESPREAD RIVER FLOODING MAY DEVELOP THIS WEEKEND AND CONTINUE INTO EARLY NEXT WEEK.***

Water Predictions  
for  
Life Decisions



# NWS Products

## Hydrometeorological Discussion



AGUS71 KRHA 311340  
HMDRHA

HYDROMETEOROLOGICAL DISCUSSION  
MIDDLE ATLANTIC RIVER FORECAST CENTER  
NATIONAL WEATHER SERVICE STATE COLLEGE PA  
840 AM EST THU MAR 31 2005

...PREPARING FOR ANOTHER ROUND OF FLOODING IN THE MID ATLANTIC...

MINOR FLOODING IS STILL OCCURRING AT POINTS IN OUR AREA, SNOW IS STILL MELTING IN NORTHERN PA, NORTHERN NJ AND NEW YORK AND NOW ANOTHER ROUND OF HEAVY RAINS ARE FORECAST. **THE COMBINATION OF ALL OF THE ABOVE IS A LIKELY SCENARIO FOR RENEWED SIGNIFICANT FLOODING RISES AT MANY OF OUR RIVER FORECAST POINTS.**

**DAY 3 QPF WAS INPUT INTO TODAYS RIVER FORECAST MODEL TO HELP OUR HYDROLOGISTS GET A GOOD FEEL FOR THE EXTENT AND MAGNITUDE OF RENEWED FLOODING LIKELY WITH THIS FRIDAY/SATURDAY EVENT. BASICALLY ANOTHER ONE AND A HALF TO TWO AND A HALF INCHES ARE EXPECTED...MAINLY FALLING IN A 12 TO 18 HOUR PERIOD.** THE HEAVIEST RAIN SHOULD OCCUR FRIDAY NIGHT INTO SATURDAY MORNING. THANKS TO PHI AND AKQ FOR THE QPF INPUT THIS MORNING!

OUR MORNING FORECASTS ARE BEING PREPARED NOW. OUR RIVER FORECAST GUIDANCE SHOULD BE ISSUED ON SCHEDULE. ALL OF OUR WFOS ARE ENCOURAGED TO CALL US AT ANY TIME WITH QUESTIONS AND CONCERNS.

WNEK

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... END MARFC ...

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Life Decisions





# 2 Days Before Flood Watch



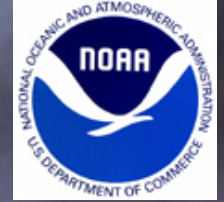
- **FLOOD WATCH**
- **NATIONAL WEATHER SERVICE BINGHAMTON NY**
- **221 PM EST THU MAR 31 2005**
- **A STORM SYSTEM WILL TRACK NORTH ALONG THE EAST COAST THIS WEEKEND...SPREADING RAIN ACROSS THE AREA FRIDAY NIGHT... AND CONTINUING INTO SATURDAY NIGHT. THE RAIN MAY BE HEAVY AT TIMES LATE FRIDAY NIGHT INTO SATURDAY NIGHT.**
- **THE COMBINATION OF THE RAIN... CONTINUED MELTING SNOW AT HIGHER ELEVATIONS... AND THE FACT THAT RIVERS AND STREAMS CONTINUE TO RUN VERY HIGH FROM THE COMBINATION OF SNOW MELT AND HEAVY RAIN THAT FELL EARLIER THIS WEEK... COULD RESULT IN FLOODING THIS WEEKEND.**
- **THE SMALLER STREAMS AND CREEKS COULD EXPERIENCE SOME FLOODING AS EARLY AS LATE FRIDAY NIGHT AND SATURDAY... WITH POINTS ALONG THE SUSQUEHANNA RIVER POSSIBLY EXPERIENCING FLOODING SATURDAY NIGHT OR SUNDAY. THE EXACT AMOUNT OF RAIN THAT WILL FALL WITH THIS STORM IS STILL FAR FROM CERTAIN... HOWEVER CURRENT INDICATIONS ARE THAT MINOR FLOODING COULD BEGIN WITH RAINFALL TOTALS AS LOW AS HALF AN INCH... WITH MODERATE FLOODING LIKELY WITH RAINFALL TOTALS GREATER THAN ONE INCH.**

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Life Decisions



# 2 Days Before Flood Watch



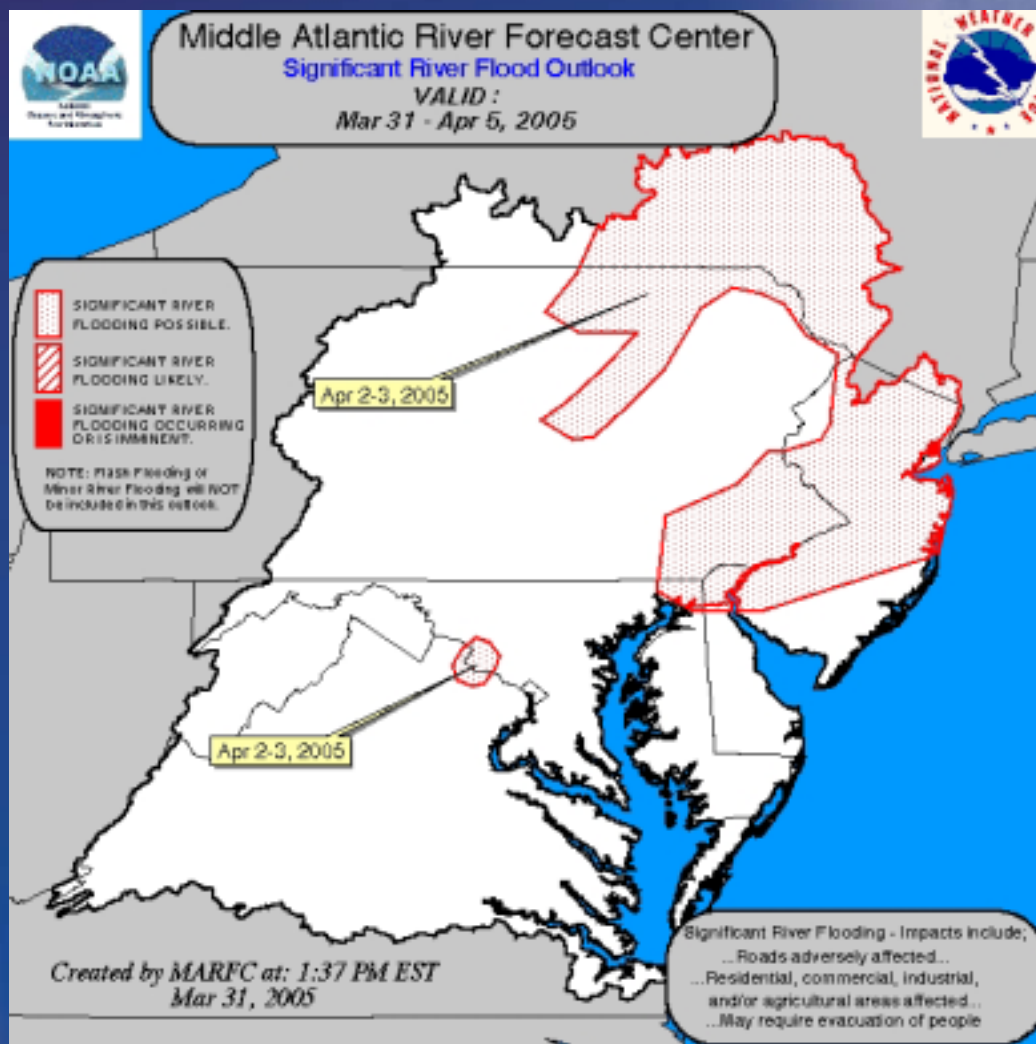
- **FLOOD WATCH**
- **NATIONAL WEATHER SERVICE MOUNT HOLLY NJ**
- **252 PM EST THU MAR 31 2005**
- **...FLOOD WATCH IN EFFECT FROM FRIDAY EVENING TO SUNDAY MORNING...**
- **RAINFALL AMOUNTS IN EXCESS OF TWO INCHES ARE POSSIBLE FRIDAY NIGHT INTO SATURDAY OVER AT LEAST PORTIONS OF EASTERN PENNSYLVANIA, NORTHERN, CENTRAL AND SOUTHWESTERN NEW JERSEY, NORTHERN DELAWARE AND FAR NORTHEASTERN MARYLAND. THOSE AMOUNTS WOULD CAUSE WIDESPREAD FLOODING**

- **OF MANY OF THE AREA'S STREAMS, WITH SOME STREAMS NOT HAVING MUCH TIME TO RECOVER FROM LAST MONDAY'S RAINS BEFORE RISING AGAIN. IF YOU LIVE IN A LOCATION THAT IS PRONE TO FLOODING, PAY SPECIAL ATTENTION TO SUBSEQUENT WEATHER FCRECASTS. IN ADDITION TO STREAM FLOODING, THERE MAY WELL BE URBAN AND POOR DRAINAGE FLOODING DURING TIMES OF THE HEAVIEST RAINFALL. THE NATIONAL WEATHER SERVICE WILL CONTINUE TO MONITOR THIS SITUATION, AND ADDITIONAL STATEMENTS AND WARNINGS WILL BE ISSUED IF NEEDED.**

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# 2 Days Before Significant Flood Outlook



Water Predictions  
for  
Life Decisions





# 36 Hours Before Follow-up Flood Watch



NATIONAL WEATHER SERVICE BINGHAMTON NY  
502 AM EST FRI APR 1 2005

THE NATIONAL WEATHER SERVICE CONTINUES A FLOOD WATCH FROM MIDNIGHT  
TONIGHT TO SUNDAY EVENING FOR THE FOLLOWING COUNTIES...

IN CENTRAL NEW YORK...

CORTLAND...CHENANGO...TOMPKINS...STEUBEN...SCHUYLER...DELAWARE...  
CHEMUNG...TIOGA...MADISON...SULLIVAN...OTSEGO...SENECA...BROOME...  
YATES...ONONDAGA...ONEIDA AND SOUTHERN CAYUGA.

IN NORTHEAST PENNSYLVANIA...

SUSQUEHANNA...BRADFORD...LUZERNE...WYOMING...LACKAWANNA...PIKE AND  
WAYNE.

A STORM SYSTEM WILL TRACK NORTHWARD ALONG THE EAST COAST THIS  
WEEKEND...SPREADING RAIN ACROSS THE AREA TONIGHT...AND  
CONTINUING INTO SATURDAY NIGHT. THE RAIN MAY BE HEAVY AT TIMES  
ON SATURDAY. IT IS ALSO POSSIBLE THAT WET SNOW COULD MIX WITH THE  
RAIN LATE TONIGHT AND EARLY SATURDAY ACROSS UPSTATE NEW YORK...AND  
THAT A PERIOD OF SNOW COULD OCCUR ON SUNDAY...TOWARDS THE END OF THE  
EVENT. HOWEVER, THE MAJORITY OF THE PRECIPITATION WILL FALL AS RAIN.

THE COMBINATION OF RAIN...RUNOFF FROM MELTING SNOW...AND VERY HIGH  
RIVER AND STREAM LEVELS WILL LEAD TO THE LIKELIHOOD OF FLOODING THIS  
WEEKEND.

THIS STORM HAS THE POTENTIAL FOR PRODUCING A WIDESPREAD RAINFALL OF  
ONE TO THREE INCHES, WITH HIGHER AMOUNTS POSSIBLE OVER NORTHEAST  
PENNSYLVANIA AND THE WESTERN CATSKILLS AND SUSQUEHANNA REGION OF NEW

YORK. THIS MEANS THAT MAJOR FLOODING WILL BE POSSIBLE IN THE  
SUSQUEHANNA AND DELAWARE RIVER BASINS.

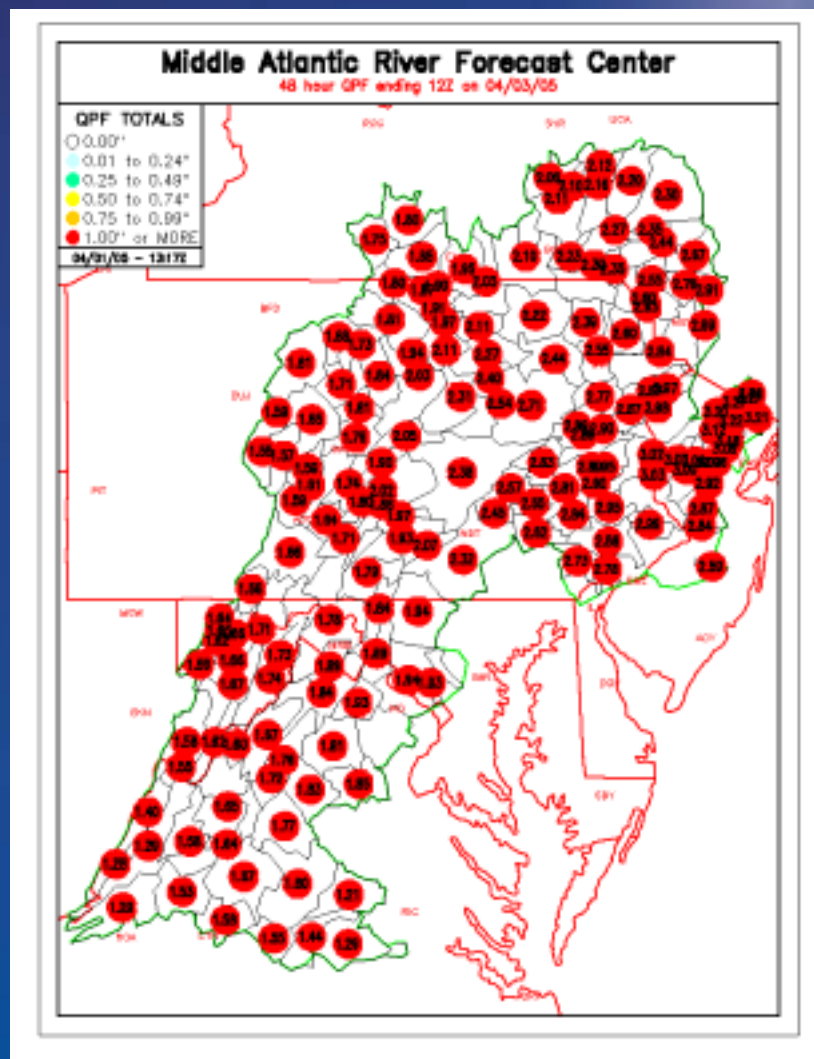
ter Predictions

Decisions



# 24 Hours Before

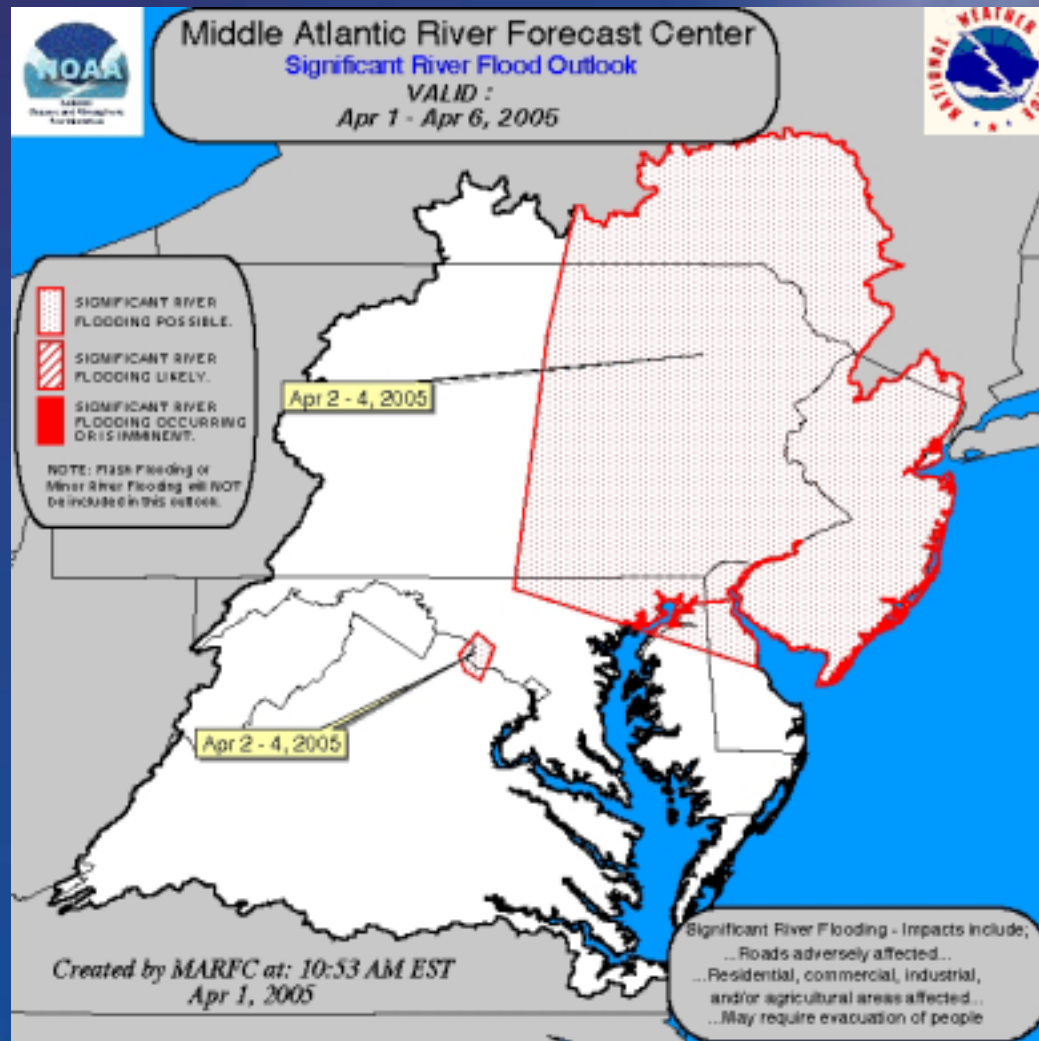
## 48 Hr Rainfall Forecast Issued Fri 4/1/05



Water Predictions  
for  
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# 24 Hours Before Significant Flood Outlook



Water Predictions  
for  
Life Decisions





# 12-24 Hours Before Flood Warning



FLOOD WARNING  
NATIONAL WEATHER SERVICE BINGHAMTON NY  
910 AM EST SAT APR 02 2005

...THE NATIONAL WEATHER SERVICE IN BINGHAMTON HAS ISSUED A FLOOD WARNING FOR THE FOLLOWING RIVERS: THE BEAVER KILL...DELAWARE RIVER... EAST BRANCH DELAWARE...WEST BRANCH DELAWARE...AND THE LACKAWAXEN RIVER.

**WEST BRANCH DELAWARE AT HALE EDDY...**

**MODERATE FLOODING IS FORECAST.**

A STAGE OF 8.6 FEET WAS MEASURED AT 8 AM SATURDAY.  
FLOOD STAGE IS 11.0 FEET.  
FLOOD STAGE WILL BE REACHED THIS EVENING  
THE RIVER WILL CONTINUE TO RISE AND CREST NEAR 14 FEET MONDAY MORNING.

**LACKAWAXEN RIVER AT HAWLEY...**

**MODERATE FLOODING IS FORECAST.**

A STAGE OF 7.9 FEET WAS MEASURED AT 8 AM SATURDAY.  
FLOOD STAGE IS 11.0 FEET.  
FLOOD STAGE WILL BE REACHED THIS AFTERNOON.  
THE FORECAST CREST IS AROUND 13 FEET LATE TONIGHT.  
THE STAGE IS FORECAST TO FALL BELOW FLOOD LEVEL MONDAY MORNING.

**DELAWARE RIVER AT CALICOON...**

**MODERATE FLOODING IS FORECAST.**

A STAGE OF 8.0 FEET WAS MEASURED AT 8 AM SATURDAY.  
FLOOD STAGE IS 12.0 FEET.  
FLOOD STAGE WILL BE REACHED THIS EVENING.  
THE FORECAST CREST IS 14 TO 15 FEET SUNDAY MORNING.  
AT 13.0 FEET, THE BANK PARKING LOT ON NEW YORK SIDE BEGINS TO FLOOD.

**DELAWARE RIVER NEAR BARRYVILLE...**

**MINOR FLOODING IS FORECAST.**

A STAGE OF 10.2 FEET WAS MEASURED AT 8 AM SATURDAY.  
FLOOD STAGE IS 17.0 FEET.  
FLOOD STAGE WILL BE REACHED AFTER MIDNIGHT TONIGHT.  
THE FORECAST CREST IS 20 TO 21 FEET BY EARLY SUNDAY AFTERNOON.  
THE FLOOD CREST ON JAN 19-20 1996 WAS 22 FEET.

**DELAWARE RIVER AT MONTAGUE...**

**MINOR FLOODING IS FORECAST.**

er Predictions

Decisions



# 12-24 Hours Before Flood Warning



FLOOD WARNING  
NATIONAL WEATHER SERVICE MT HOLLY NJ  
346 PM EST SAT APR 02 2005

...THE NATIONAL WEATHER SERVICE HAS ISSUED A FLOOD WARNING FOR...THE DELAWARE RIVER AT TOCKS ISLAND...BELVIDERE...EASTON PHILLIPSBURG BRIDGE...RIEGELSVILLE...FRENCHTOWN...STOCKTON...NEW HOPE BRIDGE... WASHINGTON CROSSING...TRENTON.

**...MAJOR FLOODING IS FORECAST FOR THE DELAWARE RIVER...**

\* TOCKS ISLAND ON THE DELAWARE RIVER...

FOR THE DELAWARE RIVER NEAR TOCKS ISLAND THE LATEST STAGE WAS 14.4 FEET RISING AT 3PM SATURDAY. THE DELAWARE RIVER NEAR TOCKS ISLAND IS FORECAST TO RISE ABOVE FLOOD STAGE BY EARLY TOMORROW AND CONTINUE TO RISE TO NEAR 26.3 FEET BY TOMORROW EVENING. AT 25.0 FEET, CAMPSITES IN WORTHINGTON STATE FOREST NEW JERSEY FLOOD. THIS CREST COMPARES TO A PREVIOUS FLOOD CREST OF 24.9 FEET ON JAN 20 1996.

\* BELVIDERE ON THE DELAWARE RIVER...

FOR THE DELAWARE RIVER AT BELVIDERE THE LATEST STAGE WAS 13.2 FEET RISING AT 3PM SATURDAY. THE DELAWARE RIVER AT BELVIDERE IS FORECAST TO RISE ABOVE FLOOD STAGE BY TOMORROW LATE MORNING AND CONTINUE TO RISE TO NEAR 23.3 FEET BY EARLY MONDAY MORNING. AT 23.0 FEET, THE APPROACH ROAD ON THE PENNSYLVANIA SIDE BEGINS TO FLOOD. THIS CREST COMPARES TO A PREVIOUS FLOOD CREST OF 23.0 FEET ON JAN 20 1996.

\* TRENTON ON THE DELAWARE RIVER...

FOR THE DELAWARE RIVER AT TRENTON THE LATEST STAGE WAS 15.6 FEET RISING AT 3PM SATURDAY. THE DELAWARE RIVER AT TRENTON IS FORECAST TO RISE ABOVE FLOOD STAGE BY TOMORROW LATE MORNING AND CONTINUE TO RISE TO NEAR 24.2 FEET BY EARLY MONDAY MORNING. AT 22.0 FEET. WATER BEGINS ENTERING PARKING GARAGE AT STATE CAPITOL BUILDING. THIS CREST COMPARES TO A PREVIOUS FLOOD CREST OF 22.2 FEET ON

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# The importance of Flood Warnings in Flood Loss Reductions



- Flood Warning is a necessary piece of flood loss reduction
- EMA and occupants must have lead time
- Effective flood warnings provides lead time
- Flood Warnings are not a substitute for reducing flood losses:
  - Flood proofing
  - Flood plain property acquisition
  - Flood plain regulations
  - Structural measures







# **The importance of Flood Warnings in Flood Loss Reductions**



- NWS estimates flood warning can reduce economic flood damage by up to 10 percent
- Approximately half of flood related deaths occur in automobiles
- Road closure lead times are provided by flood warnings
- B/C ratio for the flood warning system in the neighboring Susquehanna River basin is 12:1 (NWS, 1985)



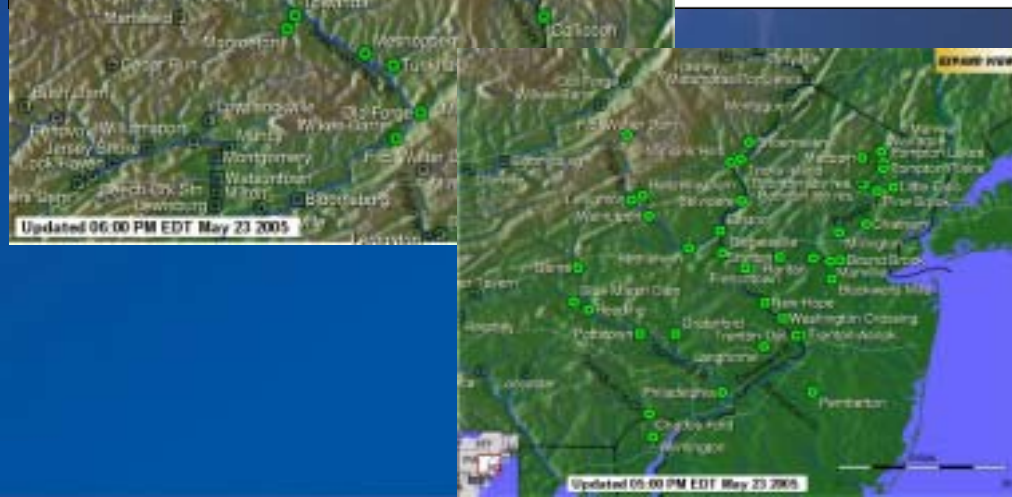
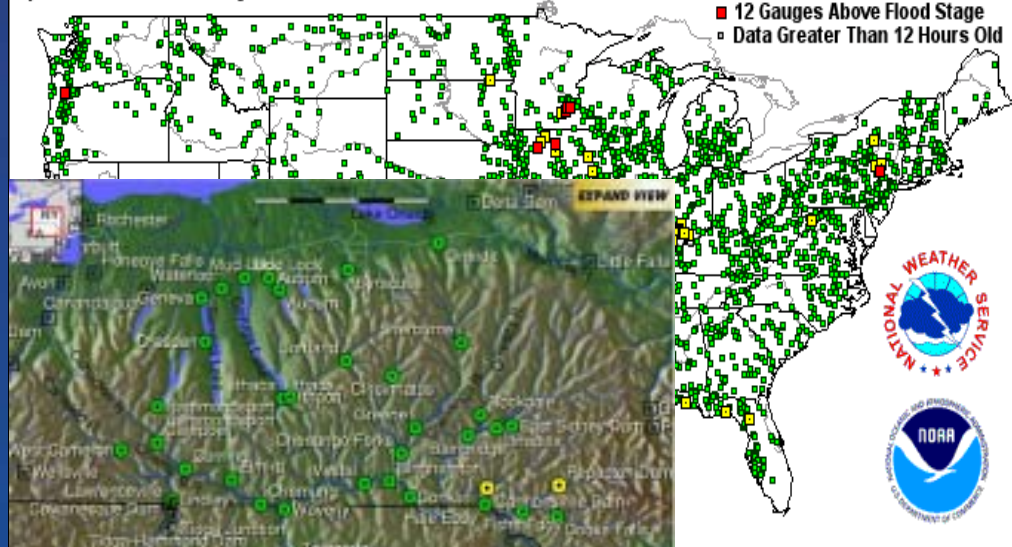
# Web Access to Forecasts and Warnings



## • Multiple Points of Entry...

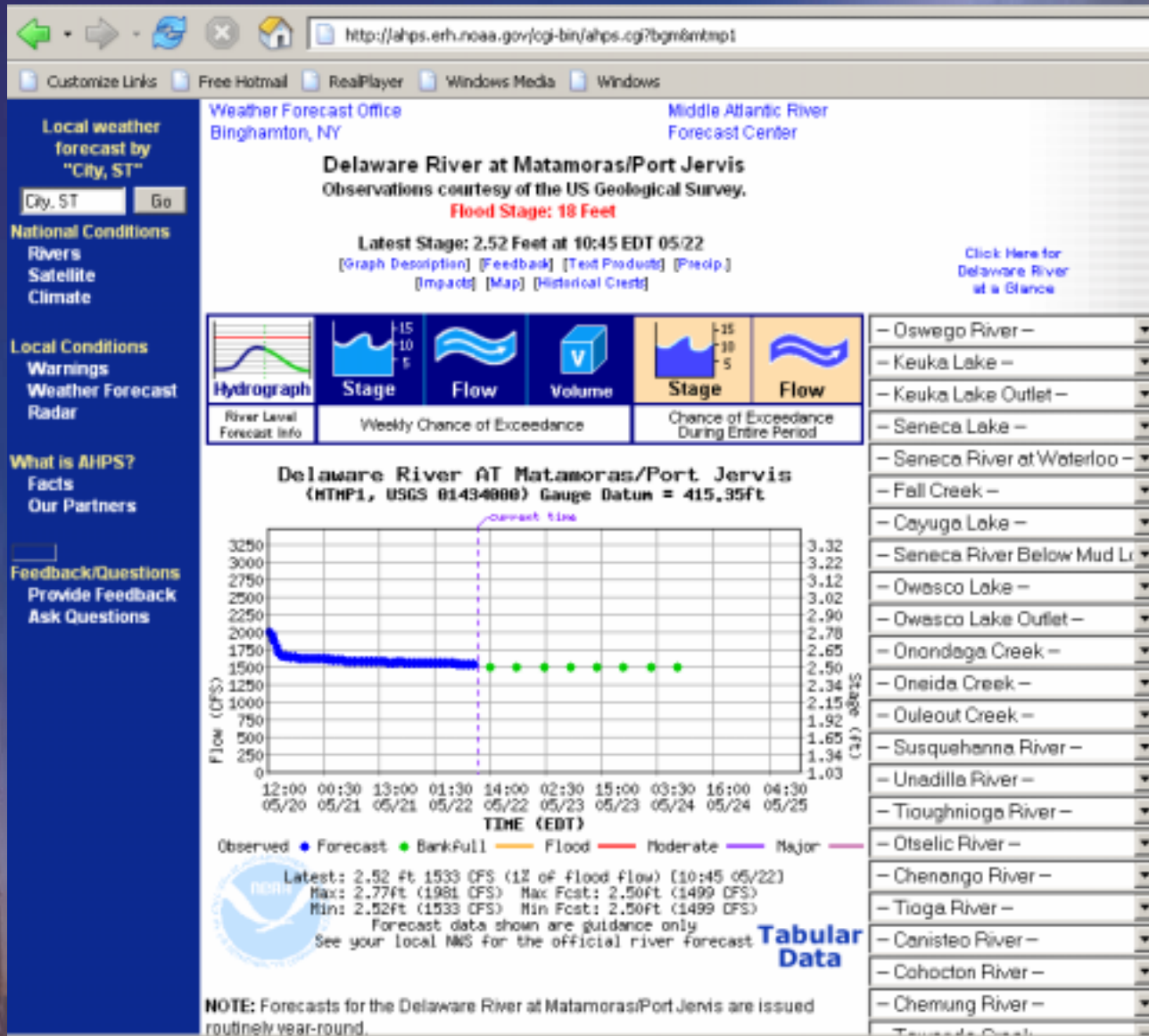
- [www.weather.gov](http://www.weather.gov)
- [www.weather.gov/ahps](http://www.weather.gov/ahps)
- [www.weather.gov/bgm](http://www.weather.gov/bgm)
- [www.weather.gov/phi](http://www.weather.gov/phi)
- [www.weather.gov/marfc](http://www.weather.gov/marfc)

Advanced Hydrologic Prediction Service  
Updated 03:41 PM CDT May 23 2005





# AHPS – Matamoras/ Port Jervis

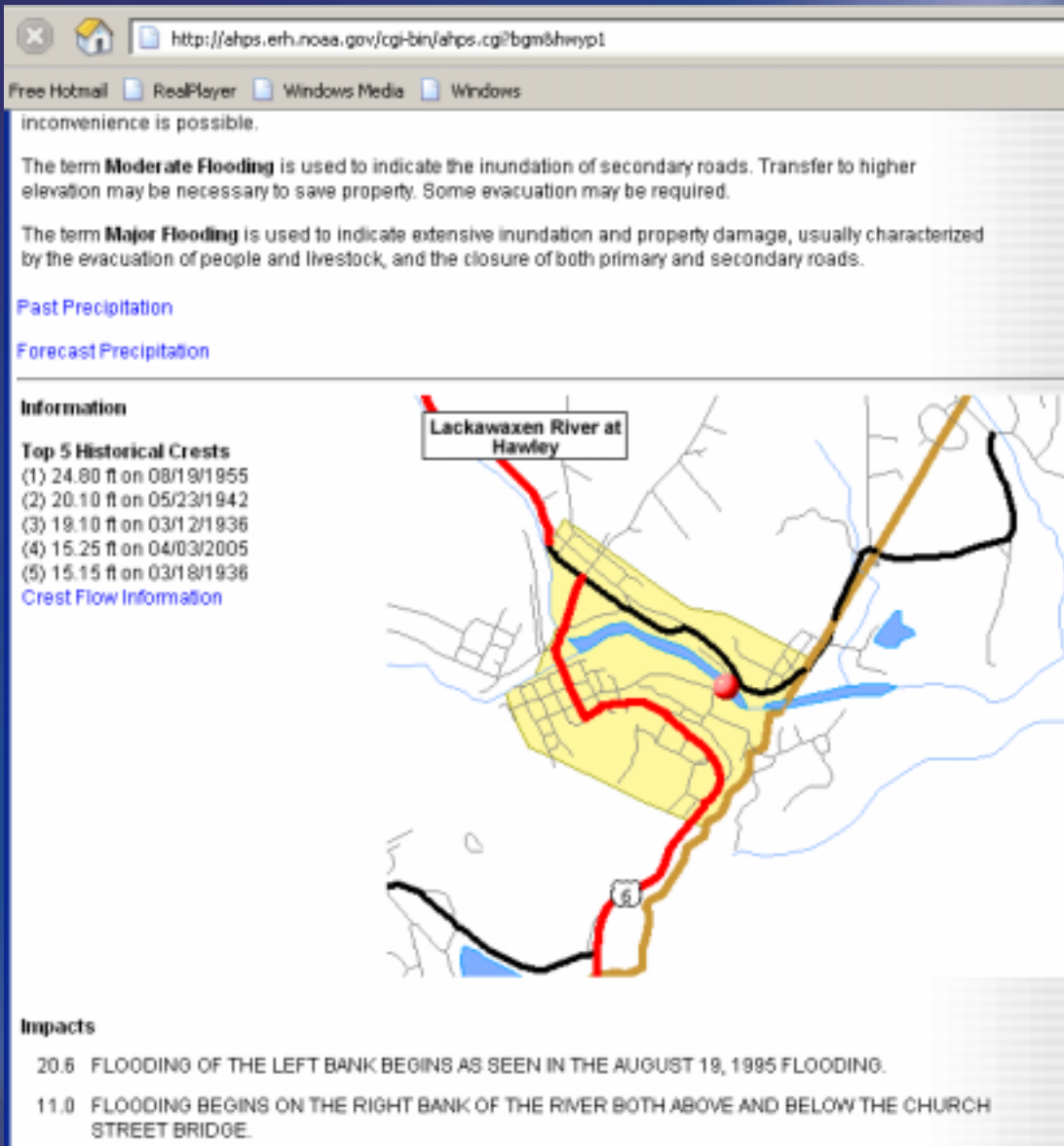


Water Predictions  
for  
Key Decisions





# AHPS – Hawley



Water Predictions  
for  
Life Decisions



# **Reservoir Impacts**

**Delaware River Basin Model  
Simulations for**

**April 2-4, 2005 Flood**

**Water Predictions  
for  
Life Decisions**



# Cannonsville Reservoir



Dec 20, 2001 6.5%





# Pepacton Reservoir



Dec 20, 2001 33.6%



# Neversink Reservoir



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# Wallenpaupack Reservoir



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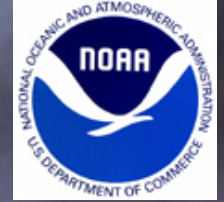
# Model Simulation



- **Asked to provide a rough estimate the reduction in flood crests due to the existence of the following four reservoirs....**
  - ***Cannonsville....we model inflow and outflow***
  - ***Pepacton....we model inflow and outflow***
  - ***Neversink....not explicitly modeled***
  - ***Wallenpaupack/Rio....not explicitly modeled***



# Model Simulation



- **Limitations**

- ***Modeling system not specifically designed for post-event scenario simulations***
- ***Modeling system not specifically designed to quantify impacts of reservoir operations downstream***
- ***Do not have resources to do detailed engineering analysis of all factors***



# Model Simulation Results

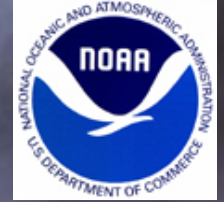


- **Our Modeling System gives a ballpark, or order of magnitude estimate only.**
- **Any further application of these results should only be done after confirmation with a comprehensive hydrologic study.**





# Model Simulation Results



- **For this event, our simulations indicate that even though these dams spilled, crest levels would probably have been higher if the four dams did not exist.**
  - ***Lower Delaware...0.5 to 1.5 foot higher crests without dams\****
  - ***Upper Delaware...1.0 to 2.5 foot higher crests without dams\****

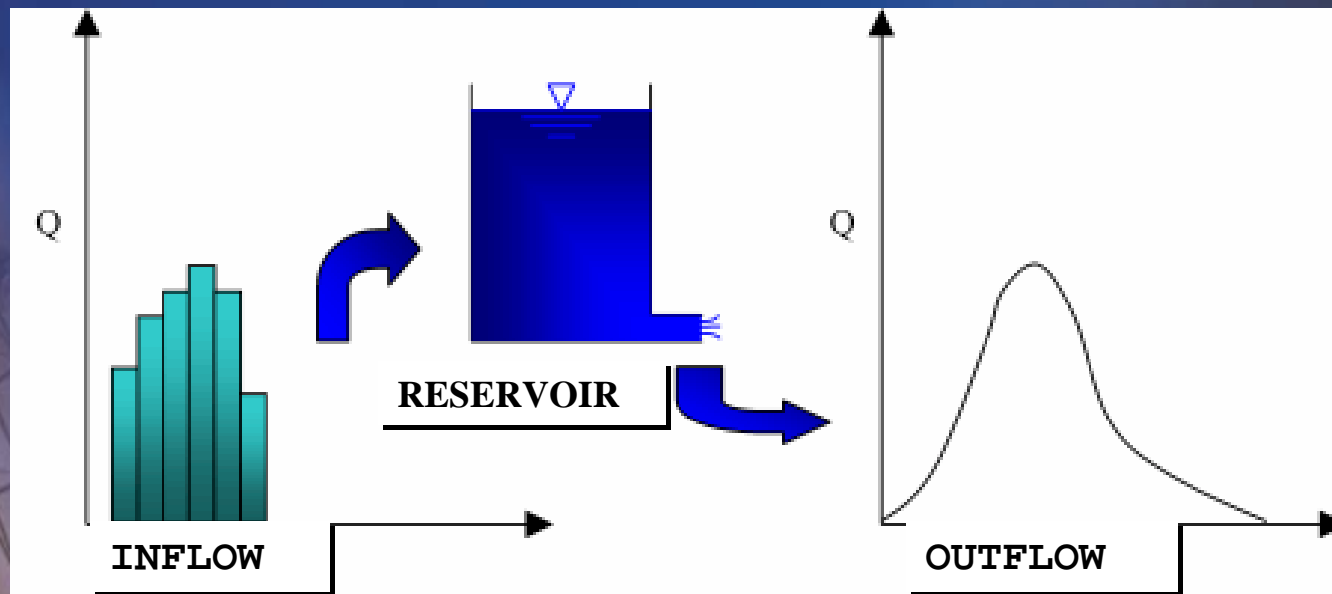
**\* Rough estimates only**

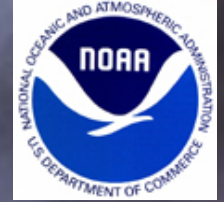
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# Spilling Reservoir Impact

- Reservoir temporarily stores water
- Outflow (Spill) is spread over longer time period than inflow
- Peak crest downstream is lowered





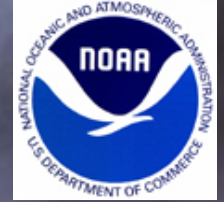
# Summary/Conclusion

- At least 19 Major Floods in the past 166 years.
- Due to above average rainfall and the March 28-29 “precursor” heavy rain event/flood event, soils were very wet and stream flows high prior to this Flood.
- Snowmelt also helped maintain high streamflows at the start of this event.





# Summary/Conclusion



- Widespread heavy rainfall on April 2-3, combined with above conditions, caused this major flood event of rare intensity.
- National Weather Service forecasts and warnings provided very good information on the timing and magnitude of the flood threat.
- The four major reservoirs likely reduced the magnitude of flood crests downstream during this event.



# THE END



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